

GENERAL ANATOMY AND PHYSIOLOGY.

3. *On the Gases contained in the Blood. Oxygen, Azote, and Carbonic Acid.*—It has hitherto been generally admitted, that the carbonic acid is formed directly in the lungs by the combination of the oxygen of the air with a part of the carbon of the blood. Dr. Stevens and Hoffman have shaken this belief, by affirming that they have obtained carbonic acid from venous blood by agitating it with hydrogen. M. G. Magnus has instituted a number of experiments with a view of verifying this result and following up the consequences; and his results are so interesting that we are induced to lay the following abstract of them before our readers.

M. Magnus passed through blood a current of hydrogen gas, previously washed with a solution of potash and lime water. As the blood became very frothy in this experiment, the vessel in which it was contained was made to communicate with a larger vessel, which received the foam. A constant current was thus kept up, and at last passed into lime water, which, after the lapse of a certain time, became opaque.

The result was the same whether the blood was immediately excluded from the air on leaving the vein, or collected over mercury by a tube introduced into the jugular vein of a horse.

When nitrogen was substituted for hydrogen, carbonic acid was exhaled from the blood in the same circumstances; and finally, lime-water was rendered turbid by the gas exhaled from blood under the air-pump, at a pressure not capable of supporting more than an inch of mercury.

The author infers that carbonic acid exists in venous blood before it reaches the lungs, and that it is not produced there by the oxydation of carbon.

Dr. Magnus endeavoured to determine the proportion of carbonic acid which may be separated from the blood, by causing it to disengage with hydrogen, and absorbing it with caustic potash in Leibig's apparatus. He did not succeed in ascertaining the precise quantity of this gas in the blood, as he only succeeded once in carrying on the experiment, without the blood becoming putrid, till hydrogen no longer carried over carbonic acid. His experiments, however, induce him to admit, that the blood contains, at least, one-fifth of its volume of carbonic acid. He obtained the following results:

<i>Human Blood.</i>		<i>Carbonic Acid.</i>	
Cubic centimetres.		Grains.	Cubic cent.
66.8	- - -	0.033	= 16.6
59.8	- - -	0.0055	= 12.8
62.9	- - -	0.044	= 22.2

at the end of twenty-four hours, when the blood emitted no odour.

<i>Blood.</i>		<i>Carbonic Acid.</i>	
Cubic centimetres.		Grains.	Cubic cent.
66.8	- - -	0.0495	= 24.9
59.8	- - -	0.0475	= 23.9
62.9	- - -	0.0675	= 34.0

Atmospheric air and oxygen, employed instead of hydrogen to drive off the carbonic acid, succeeded equally well. Hence, if carbonic acid exists in venous blood, a separation must take place according to the laws which regulate the escape of gas dissolved in a liquid, when this liquid is brought into contact with another gas.

A proportion of oxygen, or of air, will be therefore absorbed, corresponding to the quantity of carbonic acid given off, in accordance with the laws laid down by Dalton, regulating the absorption of different gases by a liquid. To prove this point, it was necessary to demonstrate, by another experiment, that arterial blood contained oxygen; for it was the sole means of showing that oxygen is not immediately converted into carbonic acid in the lungs. This was necessary also to combat the notions of Gmelin, Mitscherlich, and Tiedemann, that the carbonic acid, disengaged from blood, is derived from bicarbonate of soda in solution.

Dr. Magnus first endeavoured to procure the gas disengaged from blood by causing it to pass into the vacuum of a barometer; but this was inconvenient, and he invented another method and an instrument, called a short barometer. We shall

not describe the method or the instrument further; but merely state the results of his experiments, carefully made by causing the arterial, or venous blood, to pass directly into the instrument without coming in contact with the air.

Cubic Centimetres.

Horse's blood - - -	125	furnish	9.8 of gas	{ 5.4 carbonic acid 1.9 oxygen 2.5 nitrogen.
Venous blood of the same, taken four days after the arterial blood - - -	205	"	12.2 "	{ 8.8 carbonic acid 2.3 oxygen 1.1 nitrogen.
The same blood - - -	195	"	14.2 "	{ 10.0 carbonic acid 2.5 oxygen 1.7 nitrogen.
Arterial blood of a very old horse } in good health - - -	130	"	16.3 "	{ 10.7 carbonic acid 4.1 oxygen 1.4 nitrogen.
The same blood - - -	122	"	10.2 "	{ 7.0 carbonic acid 2.2 oxygen 1.0 nitrogen.
Venous blood of the same horse } collected three days afterwards	170	"	18.9 "	{ 12.4 carbonic acid 2.5 oxygen 4.0 nitrogen.
Arterial blood of a calf -	123	"	14.5 "	{ 9.4 carbonic acid 3.5 oxygen 1.6 nitrogen.
The same blood - - -	108	"	12.6 "	{ 7.0 carbonic acid 3.0 oxygen 2.6 nitrogen.
Venous blood of the same calf } collected four days afterwards	153	"	13.3 "	{ 10.2 carbonic acid 1.8 oxygen 1.3 nitrogen.
The same blood - - -	140	"	7.7 "	{ 6.1 carbonic acid 1.0 oxygen 0.6 nitrogen.

This table shows that not only venous blood, but that arterial also contains carbonic acid, oxygen and azote. Further, that relatively to the carbonic acid, arterial blood contains more oxygen than venous blood.

The mean proportion of gases obtained was from one-tenth to one-eighth of the volume of blood employed, and this is evidently but a small part of the gases in the blood, since by means of hydrogen, a volume of carbonic acid may be obtained equal to one-fifth of the volume of blood. This difference results from the imperfection of the apparatus.

The composition of the gases collected was determined by means of potass for the carbonic acid, and the eudiometer for oxygen.

Imperfect as they are, these experiments agree on this point, that the quantity of oxygen absorbed is nearly the same as that of the carbonic acid expired. If, then, we separate the whole quantity of gas contained in the blood, we ought to find in arterial blood precisely the same excess of oxygen as there is a deficiency of carbonic acid in venous blood. But in the present state of things we cannot arrive at such precise results.

The preceding researches, nevertheless, suffice, at least, to prove that the formation of carbonic acid is not effected solely in the lungs. This fact results principally from the difference observed between the relative proportions of carbonic acid, oxygen and azote in arterial and venous blood. The excess of carbonic acid in the latter cannot be explained, except by admitting that this gas is formed in the blood, or is absorbed by this fluid during the circulation. It is also very probable, from the above experiments, that the oxygen inspired is absorbed in the lungs, introduced into the system by the blood, and circulates with it so as to serve in the capillary vessels for oxygenation, and probably also the formation of carbonic acid.

Farther, M. Magnus accounts for the change of colour which the blood under-

goes in the lungs, by the fact of the colour of the blood becoming darker when it absorbs carbonic acid, and he says that he has observed venous blood become of lighter tint in proportion as the carbonic acid was abstracted from it by a current of hydrogen. These results are in accordance with those of Engelhart and Stevens.—*Journ. de Pharm.*, Dec. 1837.

4. *Experiments on the Spermatic Animalculæ, and on some of the causes of Sterility in Women.*—The following highly interesting observations on this subject were communicated, a short time since, to the Royal Academy of Sciences of France, by M. DONNÉ.

The spermatic animalcules (*zoospermes*) have been submitted to numerous examinations since the days of Lewenhœck, who was the first to describe them with any degree of accuracy; but hitherto little progress has been made in the discovery of their natural history, or of the part which they perform in fecundation.

M. Donn  has studied them in a new point of view. He placed them in contact with the principal fluids of the body, for the purpose of watching the effects of these fluids on their vitality, and general phenomena.

By following out this train of enquiry, he has been led to conjecture that certain changes in the properties of the mucus of the vagina and of the uterus may exercise a deleterious influence on the animalcul  of the male semen, and may thus as effectually prevent impregnation, as if there was a radical defect in the female organs of generation.

In this point of view, we perceive that some light may possibly be thrown on the hitherto most obscure subject of *sterility*.

M. Donn  commenced his researches by examining the effects of the blood itself, of milk, of the healthy vaginal and uterine mucus, of the purulent discharge in syphilis and in gonorrh a, of the saliva, and of the urine on the spermatic animalcul . He found that they continued to move and live in some of these fluids; while in others they immediately perished.

Thus blood, milk, and pus did not seem to have any visible effect upon them; but the urine and the saliva appeared to kill them at once. The mucus of the vagina and of the uterus was, as might be expected, perfectly innocuous; even the presence in it of new infusoria—which have been discovered by M. Donn  in certain vaginal discharges, and to which he has given the name of *trico-monas*—did not appear to affect the spermatic animalcul .

There are some cases, however, in which the vaginal and uterine mucus has a noxious influence. The investigation of this point constitutes the most important theme in M. Donn 's memoir. He has found, we are told, that the mucus of the vagina in some women, apparently in perfect health, is such that the spermatic animalcul  perish immediately in it.

This noxious quality belongs sometimes to the vaginal, at other times to the uterine mucus. Having satisfied himself of this fact, he next enquired whether the mucus exhibited any appreciable changes of quality from its normal properties and condition; and he thinks that he has succeeded in discovering certain traces of such changes in the chemical constitution of the secretion.

He says that the mucus of the vagina, from the vulva to the os tinc , is always *acid*, whereas that of the cervix and body of the uterus is always *alkaline*.(!) Now he supposes that in certain habits and in certain states of the system, there is a disposition to excess of acidity in the one fluid, and to an excess of alkalinity in the other. The probability of these novel ideas rests upon the results of several experiments, which M. Donn  has lately performed.

The second part of M. Donn 's Memoir is occupied with the investigation of involuntary seminal discharges. This subject has been recently examined by M. Lallemand of Montpellier; but his work is rather of a practical than of a physiological nature.

The chief object of our author's researches has been to discover, if possible, some sure diagnostic signs, by which the presence of seminal matter may be recognised in the urine. He has very satisfactorily shewn that the signs, which the Montpellier professor has pointed out for this purpose, are quite nugatory. The chief of these are the thick and troubled state of the urine, its sickening fetid